LOWER PASSAIC RIVER RESTORATION PROJECT

LOWER PASSAIC RIVER STUDY AREA RI/FS

AVIAN COMMUNITY SURVEY
ADDENDUM TO THE
QUALITY ASSURANCE PROJECT PLAN

FISH AND DECAPOD CRUSTACEAN TISSUE COLLECTION
FOR CHEMICAL ANALYSIS
AND FISH COMMUNITY SURVEY

FINAL

August 9, 2010
Revision Number: 0
Addendum Number 2

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Acronyms

CPG	Cooperating Parties Group
ENSP	Endangered and Nongame Species Program
ERA	ecological risk assessment
FC	field coordinator
GPS	global positioning system
HHRA	human health risk assessment
LPRSA	Lower Passaic River Study Area
NJDEP	New Jersey Department of Environmental Protection
NJDFW	New Jersey Division of Fish and Wildlife
NOAA	National Oceanic and Atmospheric Administration
PA	Partner Agencies
PQO	project quality objective
QAPP	quality assurance project plan
QA/QC	quality assurance/quality control
RM	river mile
SOP	standard operating procedure
USACE	US Army Corps of Engineers
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
Windward	Windward Environmental LLC

Introduction

This document describes the avian community survey that will be conducted to qualitatively assess the avian community in the Lower Passaic River Study Area (LPRSA) during four seasonal survey events. It is an addendum to the *Lower Passaic River Restoration Project Quality Assurance Project Plan: Fish and Decapod Crustacean Tissue Collection for Chemical Analysis and Fish Community Survey* (Windward 2009), hereafter referred to as the Fish/Decapod Quality Assurance Project Plan (QAPP). The Fish/Decapod QAPP was reviewed by the US Environmental Protection Agency (USEPA) and its Partner Agencies (PA)[1] and approved by USEPA on August 6, 2009. This document is Addendum No. 2 to the Fish/Decapod QAPP (Windward 2009). Data collected will include the diversity and abundance of avian species present during each of the four seasonal surveys conducted over a 12-month period, as well as the habitats and locations in the LPRSA where avian species are observed.

Addendum No. 2 includes updates to worksheets and attachments relevant to the avian community survey; it does not include updates to those worksheets or attachments that are not relevant to the avian survey effort. Applicable and updated worksheets and attachments included in this addendum are presented below:

- Worksheet No. 1 contains the title and approval pages for the addendum.
- Worksheet No. 3 provides the distribution list.
- Worksheet No. 9 provides a record of relevant communication with USEPA and the Partner Agencies pertaining to the avian community survey.
- Worksheet No. 10 describes the specific problem definition for the avian community survey.
- Worksheet No. 11 provides the project quality objectives.
- Worksheet No. 13 provides a summary of secondary data criteria and limitations.
- Worksheet No. 14 provides a summary of project tasks.
- Worksheet No. 16 provides the schedule and timeline.
- Worksheet No. 18 provides the proposed survey locations.
- Worksheet No. 21 provides the standard operating procedure (SOP) references table.
- Worksheet No. 29 provides a summary of project documents and records.
- Worksheet No. 37 provides the usability assessment.
- Attachment Y provides procedures for conducting the avian community survey.
- Attachment Z provides the avian community survey field form.

[1] The Partner Agencies include the US Army Corps of Engineers (USACE), New Jersey Department of Environmental Protection (NJDEP), New Jersey Department of Transportation (NJDOT), National Oceanic and Atmospheric Administration (NOAA), and the US Fish and Wildlife Service (USFWS).

QAPP Worksheet No. 1. Title and Approval Page

Avian Community Survey, Addendum No. 2 to the *Lower Passaic River Restoration Project Quality Assurance Project Plan: Fish and Decapod Crustacean Tissue Collection for Chemical Analysis and Fish Community Survey*

Document Title

Windward Environmental LLC (Windward)

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Project Coordinators:

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Bill Potter, de maximis, inc., Date

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QAPP Worksheet No. 1. Title and Approval Page

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	Robert Law, de maximis, inc., Date
	Printed Name/Organization/Date

Approval Signatures:

USEPA Project Manager	
Approval Authority	Signature
	Stephanie Vaughn, USEPA, Date
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USEPA Project QA Officer	
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QAPP Worksheet No. 9. Project Scoping Session Participants Sheet

Project Name:	LPRRP Ecological and Human Health Risk Assessment
Site Name:	LPRSA
Projected Date(s) of Sampling (i.e., sampling dates projected at time of meeting):	May 2010, July 2010, October 2010, January 2011
Site Location:	LPRSA
Project Manager:	Bill Potter/Robert Law, de maximis, inc.
Date of Session:	January 14 and 15, 2009
Scoping Session Purpose:	Workshop to discuss the ecological risk assessment (ERA), the human health risk assessment (HHRA), and the implementation of FSP2 in 2009.

Participants: USEPA, PA (NOAA, USFWS, NJDEP, NJDOT, USACE), Cooperating Parties Group (CPG), de maximis, inc., AECOM, Windward

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QAPP Worksheet No. 9. Project Scoping Session Participants Sheet

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January 2009 Risk Assessment and FSP2 Field Sampling Program Goals Meeting	
Purpose:	A meeting to discuss the ERA, HHRA, and FSP2 was held January 14 and 15, 2009, at K&L Gates in Newark, New Jersey. The purpose of this meeting was to address the components of the ERA and HHRA and discuss the goals of the 2009 FSP2 field sampling program. The components of the meeting relevant to the avian community survey are listed below.
Action Items:	• USACE will deliver the Passaic River kingfisher survey data and report to CPG and will discuss possible additional activities to be undertaken by CPG. • CPG will look into including the kingfisher survey as part of the avian survey.

QAPP Worksheet No. 9. Project Scoping Session Participants Sheet

Project Name:	LPRRP Ecological and Human Health Risk Assessment
Site Name:	LPRSA
Projected Date(s) of Sampling (i.e., sampling dates projected at time of meeting):	May 2010, July 2010, October 2010, January 2011
Site Location:	LPRSA
Project Manager:	Bill Potter/Robert Law, de maximis, inc.
Date of Session:	February 11, 2010
Scoping Session Purpose:	Phone call to discuss the status of the 2006 belted kingfisher survey in the LPRSA

Participants: USACE, Windward

Name	Affiliation	Phone No.	E-mail Address
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February 11, 2010, Telephone Conversation	
Purpose:	The purpose of this phone conversation was to discuss the 2006 belted kingfisher survey including the methods and results of the survey. The survey report will be attached to the focused ecosystem restoration plan document (not yet published) and therefore is not yet available.
Action Items:	• Lisa discussed the general methods and preliminary results of the study: – No belted kingfishers or active kingfisher burrows were observed on the banks or shoreline of the LPRSA. – Active burrows were identified on the shoreline of some the LPR tributaries. • USACE will finalize the survey report for publication as soon as possible. • USACE recommended that all 2010-2011 survey sites be co-located with potential kingfisher burrow survey sites identified during the 2006 survey.

QAPP Worksheet No. 10. Problem Definition

The problem to be addressed by the project:
Four seasonal avian community surveys will be conducted to provide qualitative data on the birds that use the LPRSA. Previous investigations focused primarily on the lower portion of the LPRSA (River Mile [RM] 1 to RM 7) (BBL 2002; Ludwig et al. 2010; Iannuzzi and Ludwig 2004); therefore, limited information is available on the avian community in the upper portion of the LPRSA, from approximately RM 7 to RM 17.4. Data collected during the four seasonal surveys conducted over a 12-month period will be used to provide qualitative descriptions of the birds that can be readily observed in habitats that are present within the LPRSA. This information will qualitatively support the ERA bird population assessment endpoint as specified in the *LPRSA Human Health and Ecological Risk Assessment Streamlined 2009 Problem Formulation* (Windward and AECOM 2009): "Protection and maintenance (i.e., survival, growth, and reproduction) of herbivorous, omnivorous, sediment-probing, and piscivorous bird populations." In addition, the results of the surveys will be used to identify exposure areas for bird populations for the ERA, to provide information on avian habitat use in the LPRSA, and to aid in restoration planning in the LPRSA. Details on the project quality objectives are presented on Worksheet No. 11.
The environmental questions being asked:
The primary question defined for this effort is: "What bird species are present in the LPRSA during the spring, summer, fall, and winter seasons?" The results of the avian community surveys will be used to qualitatively assess what birds are present in the LPRSA during each season, including the relative abundance of birds during each season, in each zone (i.e., freshwater and estuarine zones of the LPRSA), and in different habitat types.
Observations from any site reconnaissance reports:
Site reconnaissance specific to the avian community surveys has not been conducted. However, during the late summer/early fall 2009 fish/decapod fish community survey and the fall 2009 benthic community survey, the CPG field team observed several bird species: osprey, mallards, heron and egret species (including great blue heron and black-crowned night heron), cormorants, kingfisher, and raptor species (Rodriquez 2010).
A synopsis of secondary data or information from site reports:
Avian community survey data have been previously collected in the LPRSA, primarily from RM 1 to RM 7, but there are very limited data from the upper 11 miles of the LPRSA. A USACE (1987) flood control study for the Passaic River Basin reported that the LPRSA was used as a stopover point for migrating waterfowl during spring and fall. The most comprehensive survey was conducted by Tierra Solutions over four seasons in 1999 and 2000 in the lower portion of the LPRSA (i.e., PRSA 1999-2000 bird community survey), as documented by BBL (2002), Iannuzzi and Ludwig (2004), and Ludwig et al. (2010)). Survey dates for this

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effort were as follows:

- Fall survey was conducted on August 25, August 31, September 1, and September 2, 1999
- Winter survey was conducted on March 10, 2000
- Spring survey was conducted on May 7, May 8, May 9, and May 15, 2000
- Summer survey was conducted on July 28, August 2, August 3, and August 4, 2000

Field observations of locations where birds were counted during each survey were noted and included mudflats, shorelines and bridges. The intertidal mudflats and their associated shallow-water subtidal areas were identified as important habitats and the only available foraging habitats for water birds between RM 1 and RM 7 (Iannuzzi and Ludwig 2004).The range of expected periods of bird activity was captured by conducting bird counts at both low and high tides during all seasonal surveys, with the exception of the winter season survey. Spring, summer, and fall had similar numbers of species observed (24, 21, and 22, respectively); only 8 species were observed during winter (BBL 2002).

Forty-seven bird species from various feeding guilds were reported in the surveys conducted by Tierra Solutions (as presented in Table 10-1) (Iannuzzi and Ludwig 2004). There are 18 general bird classifications for the species observed:

- Wading birds
- Swans, geese and ducks
- Pelicaniformes
- Diurnal raptors
- Shore birds
- Gulls
- Old world parrots
- Pigeons and doves
- Kingfishers
- Tyrant flycatchers
- Jays and crows
- Swallows
- Mimids
- Starlings, cardinals

QAPP Worksheet No. 10. Problem Definition

- Emberzine sparrows and allies
- Icterids
- Finches
- Old world sparrows

Gulls were the most abundant bird species associated with aquatic habitat that were observed, followed by ducks and bridge-nesting swallows (Iannuzzi and Ludwig 2004). Herring gull and ring-billed gull were observed year-round, as were Canada goose, mallard, and American black duck. Double-crested cormorant, heron, and egret were the most abundant high-trophic-level aquatic bird species (Iannuzzi and Ludwig 2004).

Ludwig et al. (2010) summarized the 1999-2000 PRSA avian community survey results, focusing on water birds, including gulls, ducks, geese, sandpipers, herons, egrets, osprey, double-crested cormorant, and belted kingfisher. Ludwig et al. reported that 25 species of water birds were observed at least once during the survey; gulls were the most abundant species (70% of all water birds counted) followed by mallard, double-crested cormorant, Canada goose, great egret, spotted sandpiper, American black duck, great blue heron, and black-crowned night heron. Excluding gulls, water birds were most abundant in the fall (with an average count of 71 individuals) followed by summer, winter, and spring (with an average count of 64, 60, and 55 individuals per event, respectively). Seasonal differences in bird usage were observed. More wading birds, cormorants, and kingfishers were observed in the fall, whereas more shorebirds were observed in the spring. In contrast, the highest numbers of gulls and mallard ducks were counted in the winter. Overall, greater numbers of water birds were observed during the sunrise surveys (excluding gulls).

The avian community survey data were analyzed along with data collected for the habitat characterization survey conducted in 1999-2000 (Tierra Solutions 2002) to evaluate bird-habitat relationships by calculating the percentage of time that bird species were observed on four different substrates (open water, intertidal mudflat, shoreline, or bridge) during different tides (Ludwig et al. 2010). Water birds were most frequently observed on mudflats (34% of observations) followed by shoreline, bridges, and on the water (33%, 18%, and 15%, respectively). Differences in habitat use among bird groups were reported: gulls, cormorants, and wading birds were most frequently reported on bridges or shoreline; waterfowl were most frequently observed on the water; and shorebirds were evenly divided between shoreline and mudflats(Ludwig et al. 2010).

In 2006, USACE conducted a survey of the belted kingfisher population in the Lower Passaic River and its tributaries. The purpose of the investigation was to identify kingfisher burrows along the banks and riparian zones and to characterize the suitability of available habitat for breeding kingfishers based on USFWS habitat suitability index models (Malcolm Pirnie et al. 2006). The preliminary findings of this investigation indicated that several burrows were located in the LPRSA, but none were active and many were occupied by mammals (USACE 2010). A final report summarizing the survey results is forthcoming as an attachment to the focused ecosystem restoration plan (Baron 2010).

QAPP Worksheet No. 10. Problem Definition

Project decision conditions:
The conditions for project decisions (i.e., those decisions that may require communication between CPG and USEPA during the field effort) include the need to relocate survey locations within the LPRSA and the need to delay or suspend surveying because of hazardous weather conditions. However, because extreme weather conditions can provide important avian observation opportunities, consideration will be given to using land-based observations points for the surveys if worker safety can be ensured. The surveys will be conducted only when there is no precipitation and will not be started on days for which sustained high winds are forecasted. The CPG will immediately suspend operations under conditions of ice formation in the river or other extreme weather and/or environmental conditions that are a threat to worker health and safety.

Table 10-1. Bird species observed during the LPRSA avian survey (1999 – 2000)

Common Name	Scientific Name	Season when Observed
Herbivorous Birds		
Canada goose[a]	*Branta canadensis*	Spring, summer, fall, winter
American goldfinch	*Carduelis tristis*	Spring
House finch	*Carpodacus mexicanus*	Spring, summer
Mallard[a]	*Anas platyrhynchos*	Spring, summer, fall, winter
Mourning dove	*Zenaida macroura*	Summer
Northern cardinal	*Cardinalis cardinalis*	Spring, summer
Red-winged blackbird[b]	*Agelaius phoeniceus*	Spring, summer
Rock dove (rock pigeon)	*Columba livia*	Fall
Budgerigar (old world parrot)	*Melopsittacus undulatus*	Spring
White-throated sparrow	*Zonotrichia albicollis*	Winter
Omnivorous Birds		
American crow	*Corvus brachyrhynchos*	Spring
Black-crowned night-heron[c]	*Nycticorax nycticorax*	Spring, summer, fall
Blue jay	*Cyanocitta cristata*	Spring
Common grackle	*Quiscalus quiscula*	Spring

QAPP Worksheet No. 10. Problem Definition

Table 10-1. Bird species observed during the LPRSA avian survey (1999 – 2000)

Common Name	Scientific Name	Season when Observed
Fish crow	*Corvus ossifragus*	Spring, summer, fall, winter
Great black-backed gull	*Larus marinus*	Spring, summer, fall, winter
Herring gull	*Larus argentatus*	Spring, summer, fall, winter
House sparrow	*Passer domesticus*	Spring, summer, fall, winter
Laughing gull	*Larus atricilla*	Spring, summer, fall
Ring-billed gull	*Larus delawarensis*	Spring, summer, fall, winter
Insectivorous Birds		
American tree sparrow	*Spizella arborea*	Summer, fall
Barn swallow	*Hirundo rustica*	Spring, summer
Eastern kingbird	*Tyrannus tyrannus*	Spring, summer
European starling	*Sturnus vulgaris*	Spring, summer, fall, winter
Gray catbird	*Dumetella carolinensis*	Spring, summer, fall, winter
Northern mockingbird	*Mimus polyglottos*	Spring, summer, fall
Northern rough-winged swallow	*Stelgidopteryx serripennis*	Spring, summer
Song sparrow	*Melospiza melodia*	Spring, summer
Invertivorous Birds		
American black duck[a]	*Anas rubripes*	Spring, summer, fall, winter
Black scoter	*Melanitta nigra*	Spring
Greater yellowlegs	*Tringa melanoleuca*	Spring, summer, fall
Lesser yellowlegs	*Tringa flavipes*	Spring
Least sandpiper	*Calidris minutilla*	Fall
Spotted sandpiper	*Actitis macularius*	Spring, summer, fall
White-winged scoter	*Melanitta fusca*	Winter
Wood duck[a]	*Aix sponsa*	Spring

QAPP Worksheet No. 10. Problem Definition

Table 10-1. Bird species observed during the LPRSA avian survey (1999 – 2000)

Common Name	Scientific Name	Season when Observed
Piscivorous Birds		
Belted kingfisher	*Ceryle alcyon*	Spring, summer, fall
Common merganser	*Mergus merganser*	Spring
Double-crested cormorant	*Phalacrocorax auritus*	Spring, summer, fall, winter
Great blue heron[d]	*Ardea herodias*	Spring, summer, fall
Great egret[d]	*Ardea alba*	Spring, summer, fall
Green heron[d]	*Butorides virescens*	Spring, summer, fall
Little blue heron[d]	*Egretta caerulea*	Fall
Osprey[e]	*Pandion haliaetus*	Fall
Snowy egret	*Egretta thula*	Summer, fall
Carnivorous Birds (Raptors)		
Peregrine falcon[f]	*Falco peregrinus*	Spring
Red-tailed hawk	*Buteo jamaicensis*	Winter

Source: Iannuzzi and Ludwig (2004), BBL (2002)

[a] Herbivorous, insectivorous, invertivorous.

[b] Primarily herbivorous but also insectivorous.

[c] New Jersey State endangered species.

[d] Mostly piscivorous but also carnivorous, invertivorous, and insectivorous (green heron).

[e] New Jersey State threatened species (breeding population); New York State special concern species.

[f] New York State and New Jersey State endangered species.

QAPP Worksheet No. 11. Project Quality Objectives

What will the data be used for?
The information collected during the four seasonal avian community surveys described in this QAPP addendum will be used to provide qualitative, descriptive information on the species of birds in the LRPSA and to characterize their relative use of the various river zones and habitats. Results will be used in conjunction with existing site-specific avian community surveys (e.g., 1999-2000 PRSA avian community surveys (BBL 2002; Ludwig et al. 2010; Iannuzzi and Ludwig 2004)) to provide general information about bird populations and the overall types of bird species that use the LPRSA. This information will qualitatively support the ERA bird population assessment endpoint as specified in the *LPRSA Human Health and Ecological Risk Assessment Streamlined 2009 Problem Formulation* (Windward and AECOM 2009): "Protection and maintenance (i.e., survival, growth, and reproduction) of herbivorous, omnivorous, sediment-probing, and piscivorous bird populations." In addition, results of the surveys will be used to identify exposure areas for bird populations for the ERA, to provide information on avian habitat use in the LPRSA, and to aid in restoration planning in the LPRSA. Data on the locations of all bird observations will be compared with the habitat and shoreline condition data collected during the habitat identification survey, scheduled for August 2010, in order to interpret bird-habitat relationships throughout the LPRSA.
What types of data are needed?
Data collected during the four seasonal avian community surveys will include the genus and species (when possible) of birds present and observable from each specific survey location identified in Figure 1 as well as birds observed as field personnel move between survey locations. Data collected will include the location and time of day of each observation and, to the extent possible, the numbers of individuals observed, as well as the gender, life stage (adult or juvenile), and activity (e.g., flying overhead, perched in tree, on nest) of each bird observed or heard.
How "good" do the data need to be in order to support the environmental decision?
The avian community surveys will provide qualitative information on the common and readily observable bird species present in the LPRSA during each season (spring, summer, fall, and winter). The primary data to be collected will be the genus and species observed, to the extent possible, of all avian species noted, either through visual observation or the sound of bird calls. Information on the number of individuals per species and the location of each observation in the LPRSA will also be collected. Other supplemental information, such as gender, life stage, and activity, will be collected when possible. Data generated by this survey will not provide repeatable, quantitative information on any population or community parameter and will therefore not be appropriate for quantitative applications, such as the characterization or evaluation of current species richness, population sizes, the occurrence and types of rare species, or temporal trends (through comparison with other survey results) in species richness or abundance.

QAPP Worksheet No. 11. Project Quality Objectives

How many data are needed?
Qualitative observations on the presence of birds will be made at locations throughout the LPRSA in order to describe the avian community present in the LPRSA. A greater level of effort will be expended for the fall avian survey than for the summer, winter, and spring surveys in order to provide avian survey data comparable to data collected during the 1999-2000 PRSA avian community survey (Ludwig et al. 2010). Although the summer, fall, and spring events of the 1999-2000 PRSA avian community survey consisted of the same level of effort, the greatest abundance of birds was documented during the fall event; thus the fall event was selected for the extended level of effort during the 2010-2011 avian community survey. Twenty-four survey locations (detailed in Worksheet No. 18) will be visited during each of the seasonal avian community surveys. During the summer, winter, and spring surveys, each location will be visited at least twice during each seasonal survey; once near sunrise and once near sunset, with additional visits near midday or during high tide when possible, for a total of 2 (minimum) to 4 visits at each location over the duration of the summer, winter, and spring surveys. During the fall avian survey, each location will be visited three times daily (near sunrise, midday, and sunrise) for four days for a total of 12 visits at each location over the duration of the fall survey. In addition to the bird observations made at survey locations, during all four seasonal surveys, observations will be made in transit between survey locations along the shorelines of the LPRSA. (Additional details on the survey are presented in response to the question below, "Where, when, and how should the data be collected/generated?")
Where, when, and how should the data be collected/generated?
Four seasonal surveys will be conducted in August 2010, October 2010, January 2011, and April 2011 (the proposed schedule is presented in Worksheet No. 16, but actual dates may change as a result of predicted tides). The surveys will be conducted only when there is no precipitation and will not be started on days for which sustained high winds are forecasted. Each seasonal survey will be 4 to 5 days in length, and most bird observations will be made near sunrise and sunset in order to focus the survey on times when birds are likely to be most active.[2] Each seasonal survey will be scheduled such that low tide will occur near sunrise and sunset during approximately 3 to 4 days to ensure adequate mudflat exposure for wading birds, and high tide will occur near sunrise and sunset (or as close as is practicable) during 1 day of the survey event. This schedule is similar to the approach used for the 1999-2000 PRSA avian community survey (Ludwig et al. 2010). The 24 survey locations selected for the avian community surveys (and the rationale for their selection) are presented in

[2] If fall and winter surveys coincide with waterfowl hunting seasons, which are typically from October through January (schedules for waterfowl hunting is posted on the New Jersey Division of Fish and Wildlife website: http://www.state.nj.us/dep/fgw/), the hunting may make waterfowl more active during the midday in nearby areas where hunting is not allowed.

QAPP Worksheet No. 11. Project Quality Objectives

Worksheet No. 18 of this addendum and illustrated on Figure 1. The locations encompass the range of conditions and habitats present throughout the LPRSA, including mudflats, bridge abutments, vegetation, parks, and rocky shorelines. Efforts will be made to locate survey locations within the interior of defined habitats (such as a mudflat), avoiding the boundaries between habitats, in order to aid the investigation of the bird-habitat relationships. The actual survey locations may be adjusted for optimal bird viewing potential. Distinct survey locations were selected in order to ensure that the range of estuarine and freshwater habitats present along the shoreline of the 17.4-mile LPRSA would be covered in a 4-to-5-day survey period. All locations are spaced at least 400 m apart to ensure adequate distance between survey locations in order to minimize the disturbance (i.e., flushing) of birds that are present at neighboring survey locations and to minimize the likelihood that the same individuals will be counted twice. All survey locations will be preferably accessed by boat, or by car if necessary. It is anticipated that all survey locations from RM 0 to RM 15 will be accessed by boat, and locations above RM 15 to RM 17.4 may be reached by car and then accessed on foot from the shoreline. If reached by car, the shoreline will be accessed only at public-access locations (e.g., public parks). If accessed by boat, the boat will be anchored at the survey location, and all observations will be made from the boat or the boat will be docked at a public dock, and the survey will be performed at a public-access location.

Survey locations will be grouped into transects (defined as the routes between a group of survey locations, typically along the shoreline) of approximately 3 miles in length; all survey locations within a transect will be visited during a given survey period (e.g., LPRA01, LPRA02, LPRA03, and LPRA04 will all be visited as a group starting at LPRA01 and traveling upstream to LPRA04). The survey locations are grouped into 3-mile transects (for a total of six transects) in Worksheet 18, but these groupings may be changed based on field logistics such as the feasibility of transit between the survey locations.

Additional details on the summer, winter, and spring avian surveys are provided below, followed by additional details on the more extensive fall avian survey. Field survey procedures are described in the attached SOP – Avian Community Survey (Attachment Y) as well as in Attachments G, H, P, and R in the Fish/Decapod QAPP (Windward 2009). All changes to the proposed survey plan as a result of field conditions will be communicated between USEPA and CPG technical coordinators or project managers.

Summer, winter, and spring avian community surveys

The summer, winter, and spring surveys will each be a maximum of 5 days in length and will be conducted by one field team consisting of two field personnel (not including the boat driver). Each of the 24 survey locations will be visited at least twice over the duration of the field event in 30-minute increments, once near sunrise and once near sunset, during a low tide. In addition, as time allows and as feasible for access to each location, additional visits may be made to each survey location at midday (not tidal dependent) and/or near sunrise or sunset during a high tide to capture bird activity at that survey location at other important times during the day. The 30-minute survey period was selected to maximize the number of survey locations throughout the LPRSA while still providing sufficient time to conduct the survey at each location. In addition, US Department of Agriculture avian monitoring guidance (Ralph et al. 1995) reports that most bird surveyors are able to count the majority of the birds observed at a survey location within the first few minutes of the survey. Following the first few minutes of surveying, the likelihood of double-

QAPP Worksheet No. 11. Project Quality Objectives

counting individuals increases and the likelihood of observing new individuals decreases. Field personnel will coordinate their observations as much as possible during the survey to reduce the likelihood of double-counting individuals.

The schedule for surveying all locations will be determined for each seasonal survey (i.e., spring, summer, or winter) based on tidal information and mudflat exposure during low tide throughout the LPRSA. Approximately six survey locations per day will be visited. At each survey location, field personnel will locate positions on the boat or along the shoreline from which they can observe (using binoculars or spotting scopes) or hear bird species present at that location. Adjacent riparian habitats, including tree canopies and rooftops, will also be scanned during the 30-minute survey. A recording of a chickadee alarm call will be played for 5 minutes during the 30-minute survey at each location, where practicable, to detect passerine species in adjacent riparian habitats. Any birds observed or heard will be noted on the field form (Attachment Z) and on laminated field maps (i.e., location marked with Sharpie® marker or grease pencil). Birds will be identified to the genus and species when possible, counted, and noted in terms of location (e.g., mudflat, bridge abutment), activity (feeding, flying), gender, and life stage (adult or juvenile) to the extent possible. Any birds that are observed along a transect while field personnel are moving from one survey location to another (e.g., between LPRA01 and LPRA02) will be similarly documented. The locations of all bird observations will be compared with the habitat and shoreline condition data collected during the habitat identification survey, which is scheduled to be conducted in August 2010, in order to interpret bird-habitat relationships throughout the LPRSA.

Fall avian community survey

The fall survey will be a 4-day event but entail a greater level of effort in that the 24 survey locations will be visited three times a day (i.e., near sunrise, midday, and sunset) during each of the 4 days. Each day, all 24 locations (grouped in 3-mile transects) will be surveyed near sunrise, midday, and sunset; field personnel will move slowly from one survey location to the next along the transect and record bird observations at both the survey locations and along the transect. This survey will be conducted by five to six teams, consisting of two field personnel each, allowing for simultaneous survey observations along all 3-mile transects. Consistent with the summer, winter, and spring surveys, each survey location along a transect will be visited for 30 minutes during each survey period (i.e., near sunrise, midday, and sunset) over the course of 2 hours. The survey will be scheduled so that 3 days coincide with a low tide near sunrise and sunset and 1 day coincides with a high tide near sunrise and sunset.

Prior to the fall survey, all field personnel will review their respective survey areas and locations (i.e., each 3-mile transect) as well as the bird lists and survey results from the summer 2010 survey. The field coordinator (FC) will review all survey results from all teams each day and confer with the task quality assurance/quality control (QA/QC) manager to ensure that each field crew team has complied with survey methods and that project quality objectives have been met.

Consistent with the 1999-2000 PRSA avian community survey, each 3-mile transect will be surveyed simultaneously (i.e., six teams of field personnel will survey the six 3-mile transects each day). All birds observed along the transect and at survey locations will be documented, as described above for the summer, winter, and spring surveys, on the field form (Attachment Z) and on laminated field maps. This level of effort will result in survey data that are comparable to the summer, winter, and spring

QAPP Worksheet No. 11. Project Quality Objectives

surveys (i.e., 30-minute survey period per survey location) and to the 1999-2000 PRSA avian community survey in which two 3-mile transects were surveyed near sunrise, midday, and sunset simultaneously for 4 days (Ludwig et al. 2010).

Who will collect and generate the data?

Windward will provide the field sampling coordination and most of the field personnel required to conduct the four seasonal avian community surveys. Windward will be supported by its contractor Aqua Survey, Inc., as well as de maximis, inc., as required.

How will the data be reported?

An electronic database that includes the coordinates for each avian community survey location will be maintained. The database will include the date and time each location is visited during each seasonal survey and all information on bird observations at each location (i.e., species, location, activity, life stage, and gender, as well as a tally of the number of individuals per species).

A data report summarizing the abundance and diversity of avian species observed will be provided within 90 working days after the completion of each seasonal survey. The report will include a map that identifies the survey locations and tables that summarize the avian community survey observations. The data report will summarize any modifications to the proposed surveying plan outlined in this QAPP addendum.

The observation of any species that is listed in New Jersey as endangered, threatened, or of special concern, such as individuals and/or the nests of cliff swallows and peregrine falcons or colonial waterbird nesting or roosting colonies, will be reported to the New Jersey Division of Fish and Wildlife Endangered and Nongame Species Program (ENSP). Information reported will include the latitude and longitude coordinates of the observation location and other information, as available, such as number of individuals observed, number of nests, or numbers of roosting individuals. This information will be submitted to the ENSP in the seasonal survey reports; however, if bald eagle or peregrine falcon nests or colonial waterbird nesting areas are observed, then the ENSP will be contacted within 1 to 2 days, and the appropriate form[3] will be submitted.

How will the data be archived?

Data records, forms, and notes will be scanned and stored electronically in a project file. Hard copies will be archived at Windward's main office in Seattle, Washington. Similarly, the data reports will be issued and then archived electronically and as hard copies.

[3] Information on reporting rare wildlife sightings is provided on the ENSP website (http://www.nj.gov/dep/fgw/ensp/rprtform.htm).

QAPP Worksheet No. 13. Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (originating organization, report title and date)	Data Generator(s) (originating organization, data types, data generation/collection dates)	How Data Will Be Used	Limitations on Data Use
Avian community survey data	BBL. 2002. Passaic River Study Area avian survey (1999-2000). Prepared for Tierra Solutions, Inc. BBL (Blasland, Bouck & Lee, Inc.), Syracuse, NY.	BBL. Passaic River Study Area avian community data. Data were collected in fall 1999 and winter, spring, and summer 2000.	Avian community survey data will be used to inventory the bird populations in the LPRSA and to aid in restoration planning in the LPRSA.	BBL bird community survey only covered RM 1 to RM 7 of the LPRSA.
	Iannuzzi TJ, Ludwig DF. 2004. Historical and current ecology of the Lower Passaic River. Urb Habit 2(1):3-30.			
	USACE, Passaic River belted kingfisher survey investigation summary report – preliminary draft (USACE 2010).	USACE. Lower Passaic River belted kingfisher survey data. Data were collected in 2006.		Focused on belted kingfisher observations and habitat assessment.
Habitat use by water birds	Ludwig DF, Iannuzzi J, Iannuzzi TJ, Shisler JK. 2010. Spatial and temporal habitat use patterns by water birds in an urban estuarine ecosystem: implications for ecosystem management and restoration. Hum Ecol Risk Assess 16:163-184.	BBL. Passaic River Study Area avian community data and habitat characterization data. Data were collected in fall 1999 and winter, spring, and summer 2000.	Water bird survey data and habitat characterization data will be used to inform bird-habitat relationships and to aid in restoration planning in the LPRSA.	BBL bird community survey and habitat characterization survey only covered RM 1 to RM 7 of the LPRSA.

QAPP Worksheet No. 14. Summary of Project Tasks

Project Area: LPRSA	
Sampling Tasks:	Four seasonal avian surveys will be conducted in the LPRSA in August 2010, October 2010, January 2011, and April 2011 (proposed schedule is presented in Worksheet No. 16). The seasonal surveys will be 4 to 5 days in length. Twenty-four survey locations (Worksheet No. 18, Figure 1) will be visited at least twice, once near sunrise and once near sunset during the summer, winter, and spring surveys, with additional visits near sunrise, sunset, or midday when possible. One field team consisting of two field personnel (not including the boat driver) will conduct the spring, summer, and winter surveys. During the fall survey, the 24 locations will be grouped into 3-mile transects and visited three times daily for 4 days. Six field teams consisting of two field personnel each (not including the boat driver) will conduct the fall survey, and each team will visit the same transect each day. At each specific location as well as along the transect between locations, field personnel will search for and document any birds that are seen or heard. Details on the procedures for each seasonal survey are presented on Worksheet 11 (under "Where, when, and how should the data be collected?"). SOPs applicable to the field surveying effort are presented in the attached SOP (Attachment Y: SOP—Avian Community Survey) and Attachments G, H, P, and R of the Fish/Decapod QAPP (Windward 2009).
Analysis Tasks:	At each survey site, location information (e.g., coordinates and any other relevant observations such as habitat type) will be recorded on the Avian Community Survey Field Form (Attachment Z) and on laminated field maps. Any birds observed or heard will be recorded on the field form and laminated field maps and identified to the genus and species level, when possible; numbers of individuals per species will be tallied. Each bird's activity, location, gender, and life stage will also be recorded.
QC Tasks:	All field notes and forms completed during the field survey task will be checked daily by the FC. The FC will also communicate daily with the Task QA/QC manager to confirm that project quality objectives (PQOs) are being met. Electronic equipment (e.g., global positioning system [GPS] units) will be calibrated, maintained, tested, and inspected according to manufacturers' specifications, as necessary, to ensure they are functioning properly (refer to Worksheet No. 22 of the Fish/Decapod QAPP (Windward 2009)).
Secondary Data:	Other avian community data as summarized in Worksheet Nos. 10 and 13 will also be reviewed and potentially used to accomplish project objectives.
Data Management Tasks:	The data management task will include keeping accurate records of field activities and observations so that project team members using the data will have accurate and appropriate documentation. Data management activities will be conducted in accordance with the project data management plan based on Technical Committee data rules. Field data will be stored in its native format and in the project database. GPS data will also be downloaded and stored electronically in a project file. Subsequently, the spatial data will be mapped for the data report.

QAPP Worksheet No. 14. Summary of Project Tasks

Project Area: LPRSA	
Documentation and Records:	It is important that field activities be documented in an organized and chronologically accurate manner. All field activities will be recorded in a field logbook maintained by the FC. The field logbook is intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during the sampling period. Procedures for documentation are presented in Attachment P of the Fish/Decapod QAPP (Windward 2009). All relevant forms and records are presented on Worksheet No. 29 of this addendum and the Fish/Decapod QAPP. In general, the following information must be recorded: • The identities and affiliation of the personnel conducting field activities • Model numbers and serial numbers of instruments and/or equipment being used, to the extent available • A description of the type of field work being conducted and the equipment used • The date and times that the field activities were initiated and completed, with specific information for each task (e.g., record the time activities commenced at each individual location, if applicable) • Specific survey locations where field activities were conducted. • The general methodology used to conduct the survey activities • Communications with project managers and personnel regarding field survey activities • Field-collected data (e.g., GPS measurements, catch totals) • Daily health and safety briefings • Deviations from Addendum No. 2, the Fish/Decapod QAPP (Windward 2009), or their attachments; the reason for change; and any corrective actions taken. Corrective actions will be electronically documented on the Protocol Modification Form (Attachment A of the Fish/Decapod QAPP) • Documentation of any photos associated with survey locations or field survey activities in the field logbook, including the date, time, photographer, and brief description All entries must be made in language that is objective, factual, and free of personal feelings or other terminology that might prove inappropriate. The Avian Community Survey Field Form (Attachment Z) will be filled out by field personnel. A record of all personnel briefed on the HSP will be maintained by the FC, Site Safety and Health Officer, or designee. The record will be archived at Windward's Seattle office upon completion of the sampling efforts.
Assessment/Audit Tasks:	The FC will also communicate frequently with the Task QA/QC Manager to confirm that PQOs are being met. Assessment/audit tasks will be conducted, as summarized in Worksheet No. 31 of the Fish/Decapod QAPP (Windward 2009). Reviews of field activities/survey method compliance will be conducted periodically.

QAPP Worksheet No. 14. Summary of Project Tasks

Project Area: LPRSA	
Data Review Tasks:	All field records will be reviewed by the FC for completeness and accuracy and verified by the Task QA/QC Manager or a designee.
Deliverables:	Following each seasonal avian survey, avian community data will be summarized in a data report, which will include bird species diversity and abundance. A map illustrating the actual survey locations and locations of bird observations will also be prepared. A data report summarizing the sampling effort will be provided to USEPA within 90 days after completion of each avian survey.

QAPP Worksheet No. 16. Project Schedule/Timeline Table

Activities	Organization	Date (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date of Initiation	Anticipated Date of Completion		
Prepare Addendum 2 (avian addendum to the Fish/Decapod QAPP) and submit to USEPA	Windward	01/25/10	08/09/10	Fish/Decapod QAPP Addendum No. 2	08/09/10
Conduct avian surveys	Windward	08/16/10, 10/04/10, 01/24/11, 04/11/11	08/20/10, 10/08/10, 01/28/11, 04/15/11	See below	See below
Prepare and deliver avian community survey data report to USEPA	Windward	Upon completion of each survey event	90 days after survey is complete	Avian community survey data report	90 days after survey is complete

QAPP Worksheet No. 18. Proposed Survey Locations and Transects for the Avian Community Survey

Survey Location	Easting (X)[a]	Northing (Y)[a]	RM	Description	Rationale for Survey Location
Transect 1. RM 0 – RM 3					
LPRA01	597887	686887	0.5	Large mudflat at Kearney Point	Diversity of estuarine habitats, confluence with Newark Bay
LPRA02	597898	692951	1.7	Mudflat, Morris Canal, bridge, nearby marsh	Diversity of estuarine habitats, presence of bridge
LPRA03	596924	695303	2.3	Bridges, mudflats, vegetated shore, adjacent marsh	Diversity of estuarine habitats, presence of bridge
LPRA04	593569	695468	3.0	Mudflats, vegetated shore adjacent marsh	Diversity of estuarine habitats
Transect 2. RM 3 – RM 6					
LPRA05	591053	694207	3.5	Mudflats, adjacent inlet, nearby marsh	Diversity of estuarine habitats
LPRA06	589837	692444	3.9	Mudflat, gravel flats, vegetated shores, nearby marsh	Diversity of estuarine habitats
LPRA07	584584	697464	5.6	Bridges, poorly vegetated shore	Diversity of estuarine habitats, presence of bridge
Transect 3. RM 6 – RM 9					
LPRA08	585244	701731	6.4	Mudflats, gravel flats, vegetated shore	Diversity of estuarine habitats
LPRA09	586585	703596	6.8	Mudflats, gravel flats, treed shore	Diversity of estuarine habitats
LPRA10	587154	705767	7.3	Mudflats, vegetated shores, trees	Diversity of transition zone habitats
LPRA11	588860	707689	7.7	Mudflats, bridge, vegetated treed shore	Diversity of transition zone habitats, presence of bridge
LPRA12	589584	709091	8.0	Gravel flat, forested shore, mouth of Second River	Diversity of transition zone habitats, tributary confluence
LPRA13	590722	713223	8.8	Mudflats, gravel flat, vegetated shore	Diversity of transition zone habitats
Transect 4. RM 9 – RM 12					
LPRA14	592171	716497	9.6	Mudflats, gravel flat, forested shore, creek mouth	Diversity of transition zone habitats, tributary confluence
LPRA15	591898	718344	9.9	Mudflats, treed vegetated shore	Diversity of transition zone habitats
LPRA16	592592	723107	10.8	Mudflats, treed vegetated shore	Diversity of freshwater habitats
LPRA17	594537	723752	11.3	Gravel flats, shrub shore, mouth of Third River	Diversity of freshwater habitats, tributary confluence

QAPP Worksheet No. 18. Proposed Survey Locations and Transects for the Avian Community Survey

Survey Location	Easting (X)[a]	Northing (Y)[a]	RM	Description	Rationale for Survey Location
Transect 5. RM 12 – RM 15					
LPRA18	596664	729048	12.5	Gravel flats, vegetated shore	Diversity of freshwater habitats
LPRA19	597497	738110	14.2	Mudflats, gravel flats, treed shore, Dundee Canal	Diversity of freshwater habitats, off-channel habitat
Transect 6. RM 15 – RM 17.4					
LPRA20	600721	737469	15.2	Gravel flats, treed shores	Diversity of freshwater habitats
LPRA21	600663	739594	15.6	Gravel flats, treed shores, mouth of Saddle River	Diversity of freshwater habitats, tributary confluence
LPRA22	598434	743800	16.5	Gravel flats, forested island and shores	Diversity of freshwater habitats
LPRA23	597223	745720	17.0	Gravel flats, bridge, forested shores and island	Diversity of freshwater habitats, presence of bridge
LPRA24	595478	747052	17.4	Gravel flats, forested shores, Dundee Dam	Diversity of freshwater habitats

Note: Survey locations were grouped into approximately 3-mile-long transects; however, transect groupings may change based on field logistics, such as the feasibility of transit between survey locations.

[a] New Jersey State Plane (US survey ft).

RM – river mile

QAPP Worksheet No. 21. Project Sampling SOP References Table

SOP Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
12[a]	SOP – Avian Community Survey	Windward	Binoculars, camera, avian checklists	N	Attachment Y

[a] Next sequential number in Fish/Decapod QAPP and Fish/Decapod QAPP Addendum No. 1 SOP reference table (Windward 2009, 2010).

QAPP – quality assurance project plan

SOP – standard operating procedure

QAPP Worksheet No. 29. Project Documents and Records Table

Survey Documents and Records
Onsite Analysis Documents and Records
Avian Community Survey Field Form
Deliverables
Avian community survey data reports

QAPP Worksheet No. 37. Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:
All observations made during the avian community surveys will be considered usable as long as they are made according to the methods described in the applicable SOPs (Attachment Y: SOP—Avian Community Survey) and Attachments G, H, P, and R of the Fish/Decapod QAPP (Windward 2009). No formal data usability assessment report will be prepared for the avian community surveys. Any deviations from the SOPs will be documented, as appropriate, in the field logbook and on the Protocol Modification Form (Attachment A of the Fish/Decapod QAPP (Windward 2009)) and also approved by USEPA or its authorized representative.

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Attachment Y: SOP—Avian Community Survey

I. Introduction

This standard operating procedure (SOP) defines the procedures to be followed when conducting seasonal avian community surveys, where appropriate, for the Lower Passaic River Study Area (LPRSA). This SOP describes the equipment, field procedures, and documentation necessary to conduct a qualitative survey for birds and other semi- or non-aquatic biota. Other SOPs may be used with this SOP and are addressed in the Fish/Decapod QAPP (Windward 2009). All data, including information on individual bird species, survey coordinates, and times will be included in an electronic database, which will be provided to the US Environmental Protection Agency (USEPA).

II. Preparations for Survey

Addendum No. 2 identifies survey locations and survey frequencies. Field personnel are responsible for reviewing the Fish/Decapod QAPP (Windward 2009) and Addendum No. 2 prior to conducting field activities and ensuring that all field equipment are available and in acceptable condition. In addition, prior to each survey, field personnel will review the bird lists and the survey results of previous 2010-2011 surveys (when applicable). All bird observers will be experienced in conducting ecological field surveys, with an emphasis on bird surveys.

III. Equipment and Supplies

Equipment to be used during avian community surveys may include, but is not limited to, the following:

- Camera
- Video camera (for both visual and audio recordings)
- Avian checklists
- Neutral or camouflage clothing
- Field guides and taxonomic keys
- Maps (laminated)
- Tide tables
- Binoculars (6X, 7X or 8X)
- Zoom spotting scope with tripod
- Logbook and field form
- Waterproof marking pens, grease pencils
- Personal protective equipment as required (e.g., disposable gloves, safety glasses)
- Global positioning system (GPS)
- Chickadee alarm call recording and device (e.g., compact disc player) to play recording during survey

IV. Location of Survey Locations

The position of the survey location will be established. The positioning procedures are described in Attachments G and H: Locating Sample Points Using a Hand-Held Global Positioning System (GPS) and Locating Sample Points Using a Boat-Mounted Global Positioning System (GPS), respectively. Proposed survey locations are presented on Figure 1 and summarized on Worksheet No. 18 in Addendum No. 2. Survey locations may be moved or added in the field, based on *in situ* conditions and observations, which may include moving to a more optimal location based on desired habitat features or optimal viewing locations (e.g., no views blocked by overwater structures), or if many birds are observed in a different location that is still part of the desired habitat type.

V. Avian Community Survey Procedures

The following protocol shall be implemented, as practicable, to conduct avian community surveys for the LPRSA at the appropriate survey locations as described in Addendum No. 2. Four seasonal avian community surveys will be conducted during as described in Addendum No. 2. This is a qualitative survey for birds that may use the LPRSA.

The avian community survey will be conducted near sunrise and sunset over the course of 4 to 5 days during each of the four seasonal survey events. The surveys will be conducted only when there is no precipitation and will not be started on days for which sustained high winds are forecasted. The surveys will be observational. Field personnel will use binoculars and/or a spotting scope to visually identify birds or may identify birds by audible bird calls. The numbers and types of birds that are identified (either visually or by audibly) within the range of the field personnel will be noted and counted to the extent practicable.

Twenty-four survey locations are identified in Figure 1 (Addendum No. 2). These locations were chosen to maximize the number of survey locations throughout the LPRSA and to encompass the range of habitats (i.e., mudflats) present in the LPRSA. Efforts will be made to locate survey locations within the interior of defined habitats (such as a mudflat), avoiding the boundaries between habitats, in order to aid the investigation of the bird-habitat relationships.

The observational survey protocols are as follows:

1. Each survey location will be preferably accessed by boat or by land if necessary (e.g., above RM 16 where shallow water and rocky substrate may restrict boat access). If a location is accessed by boat, the field personnel will position the vessel for maximum safety and habitat viewing potential. Field personnel may reposition the boat for better viewing during the survey. If a survey location is on land (e.g., public park) and accessed via boat, field personnel will position the boat for maximum safety and depart the vessel to access the area for better viewing during the survey. If a location is accessed via car, field personnel will park the vehicle in an appropriate parking location to access the area for better viewing during the survey. Field personnel will select an appropriate viewing location along the shoreline to conduct the survey.
2. Each location will be surveyed for birds, either by sight or sound, for approximately 30 minutes. Nearby riparian habitats, including tree canopies and

rooftops, will also be scanned during the 30 minutes. Birds seen or heard during the survey will be identified and counted, to the extent practicable. A bird checklist based on Table 10-1 (Addendum No. 2) and field guides will be used to aid in the identification process. Different life stages of birds (e.g., juvenile, adult, breeding), gender, location (e.g., mudflat, bridge abutment), and activity (feeding, flying) will be noted, as possible. Other semi- or non-aquatic biota observed during the surveys will also be noted. The approximate location of each bird observed will also be documented on the laminated maps during the survey to assist in accurately documenting the locations of bird observations throughout the LPRSA.

3. A recording of a chickadee alarm call will be played for 5 minutes during the 30-minute survey at each location to detect passerine species in nearby riparian habitats. Any bird calls heard in response will be recorded.
4. The date, time, and location of the observations will be recorded in the field logbook. All bird observations will be recorded on the field form (Attachment Z).
5. Any birds observed by field personnel while in transit by boat or on foot along the shoreline between survey locations will be documented on the field form and laminated maps in the same manner as that used for birds observed at each survey location.

VI. Documentation

The field personnel are responsible for documenting field activities related to the avian survey. Observations and data will be recorded with ink in a field logbook with consecutively numbered pages and on the Avian Community Survey Field Form (Attachment Z), as appropriate. The information in the field logbook will include, at a minimum, the following:

- Name(s) of field personnel
- Date and times of activities
- Location and description of all habitats observed
- Information (i.e., date, time, location) regarding each photograph and video

Attachment Z: Avian Community Survey Field Form

Project Name: **Project No.:** **Field Personnel Initials:**

Season: **Location:**

Date: **Tide:**

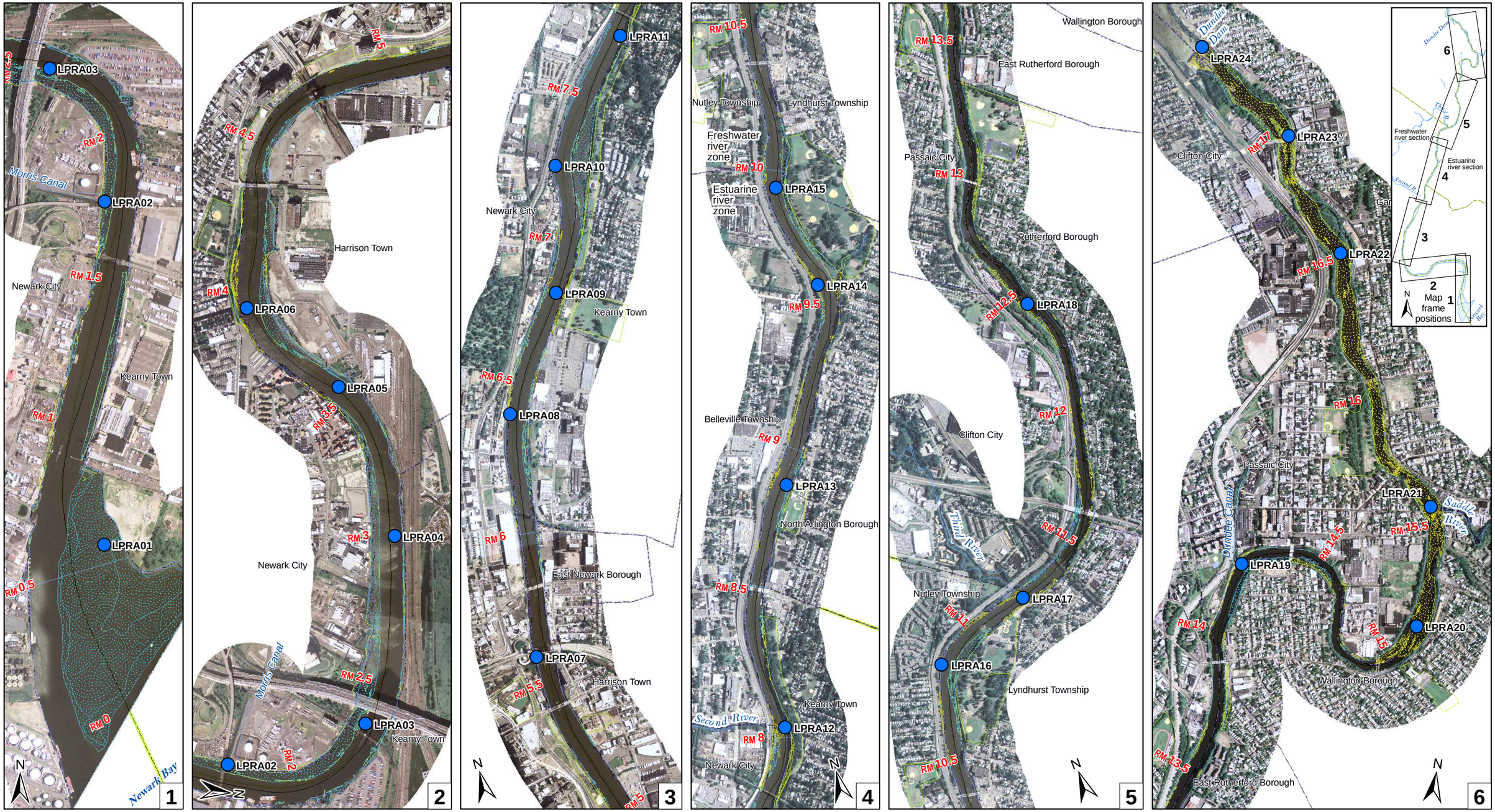
Weather: **Temperature:** **Wind Speed:** **Wind Direction:** **Sky Cover:**

Start Time	End Time	Species	Life Stage/ Gender	Count	Location[a]	Habitat[b]	Bird Activity/Comments

[a] Right or left bank (as looking upstream) or middle of the river. The approximate location should also be marked on the laminated field map.

[b] For example, bridge, mudflat, shore, or water.

Oversize Figure



0 0.5 1 Kilometers

0 0.25 0.5 Miles

- Proposed survey station
- Mudflat
- Gravel flat
- LPRSA
- River centerline
- Park
- Municipal boundary
- County boundary

Aerial photo: USGS High Resolution Orthoimagery for Coastal New Jersey, March 2006

Mudflats and gravel flats are areas where the river bottom slope is ≤6° and the depth is ≤4.5 ft MLLW (i.e., half the mean MLW to MHW tidal range plus 2 ft). Mudflats were determined as those areas of fine (i.e., silt or sand) sediment substrate, and gravel flats as areas of gravel or rock substrate. The LPRSA bathymetry layer in all areas is based on the 2004 data from Rogers Surveying (for USACE) except for the area outside Kearny Point; bathymetry in this area was estimated based on NOAA data.

Figure 1. Proposed avian community survey locations in the LPRSA

Prepared by LSM 2/10/10, map 4066; W:\Projects\06-58-01 Passaic RI\Data\GIS\Maps_and_Analysis\FWexposure